SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Everglades Stormwater Treatment Areas: Operations and Performance Update

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South Florida Water Management District

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Everglades Stormwater Treatment Areas (STAs) and Flow Equalization Basins (FEBs)

STAs (effective treatment area)

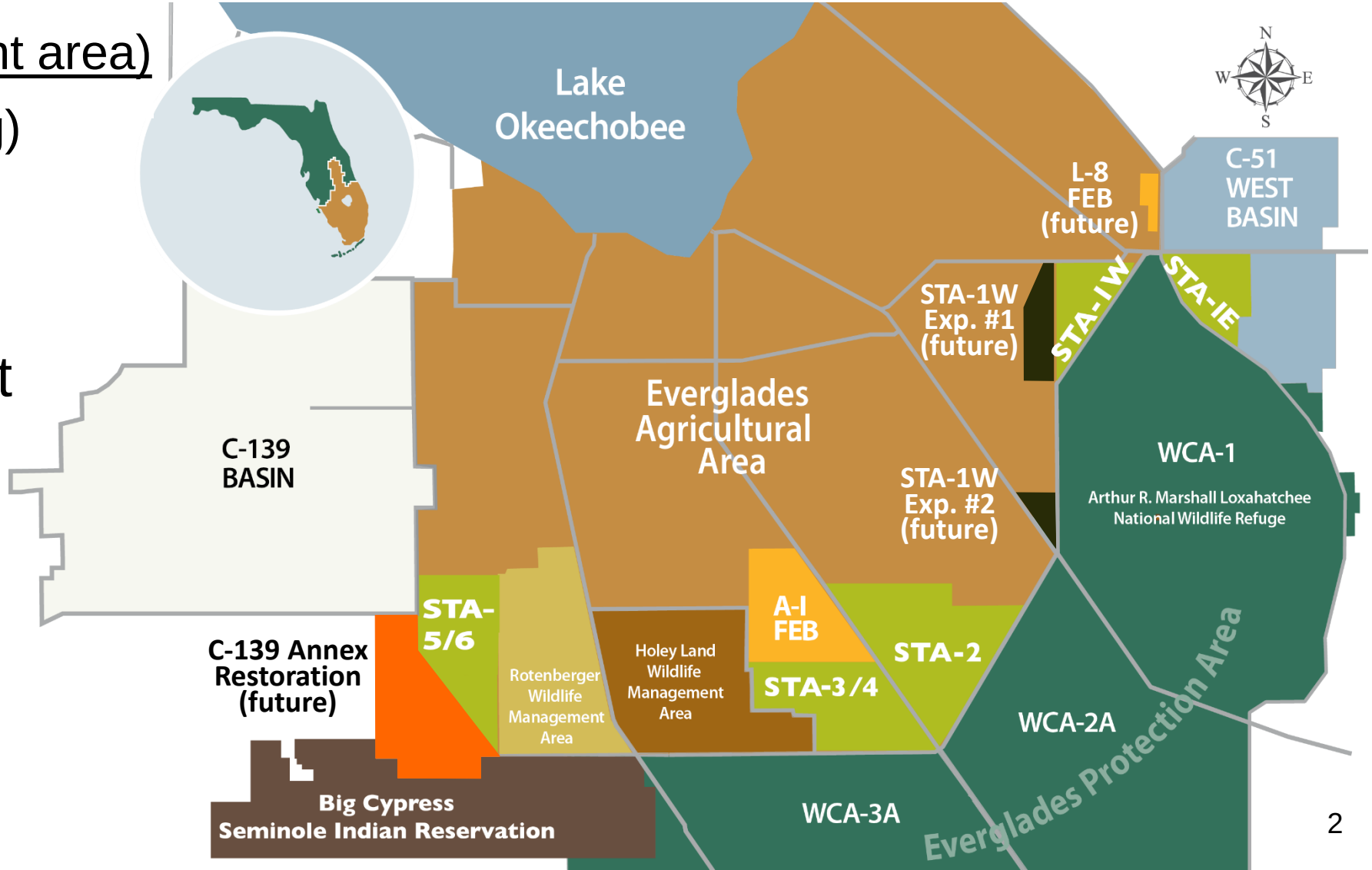
- 57,000 acres (existing)
- 6,700 acres (future)

A-1 FEB

- 15,000 acres x 4 feet
- 60,000 acre-feet

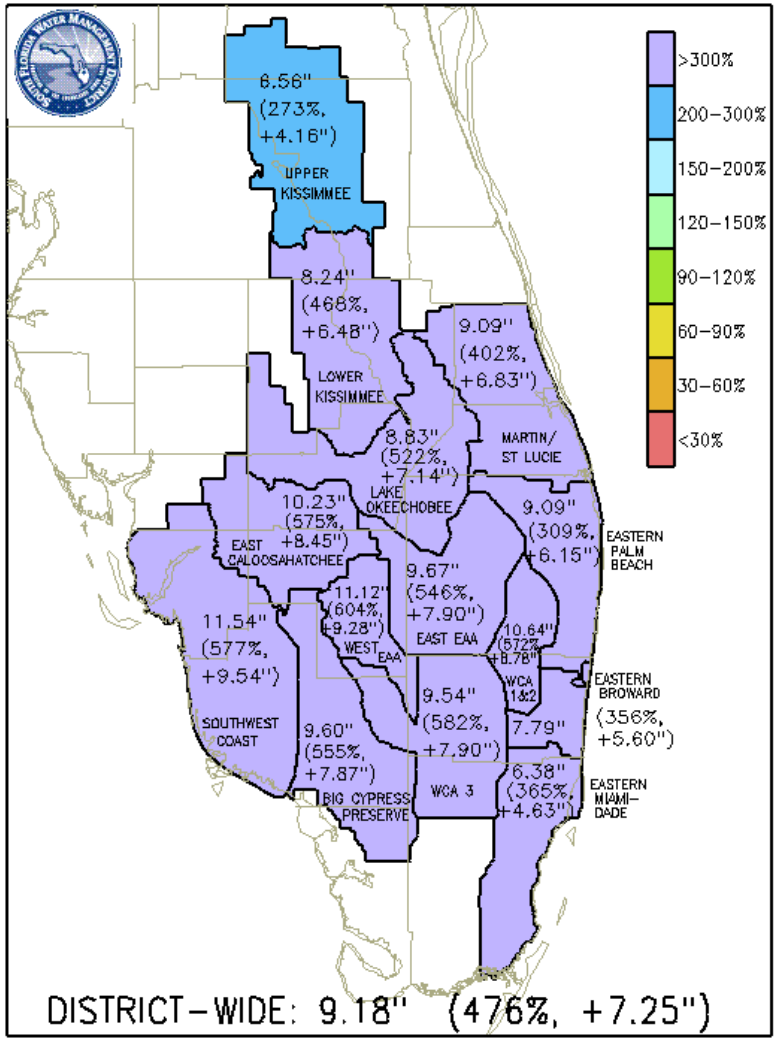
L-8 FEB (future)

- 780 acres x 58 feet
- 45,000 acre-feet

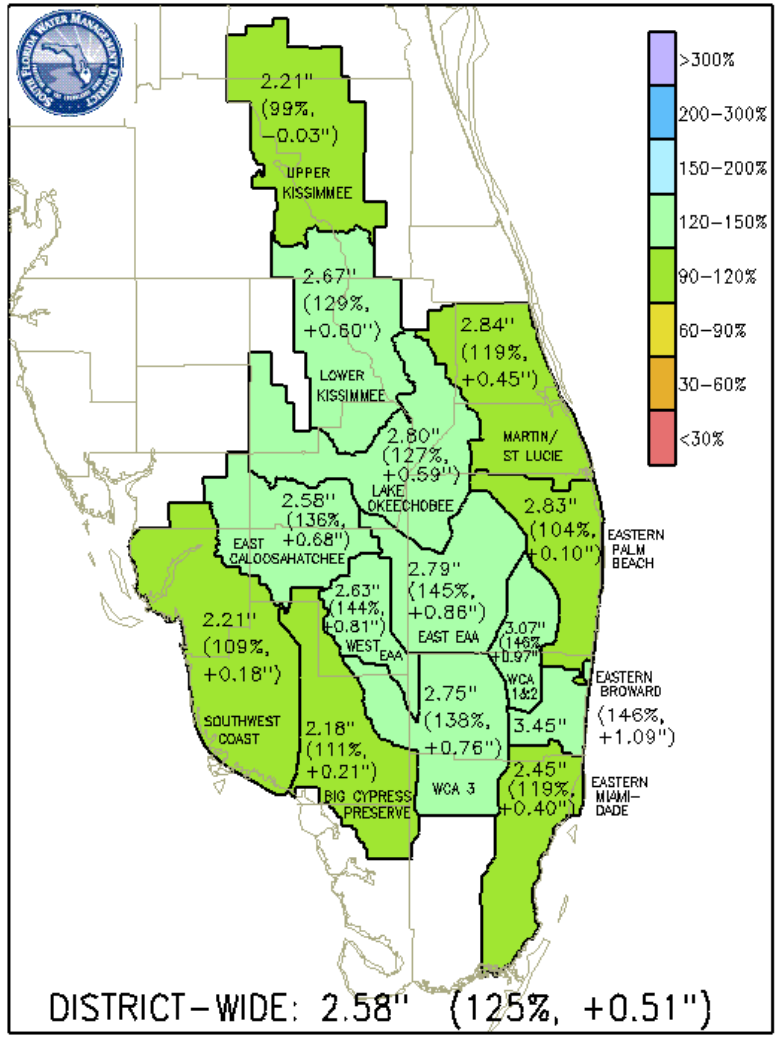


Above Average Dry Season Rainfall

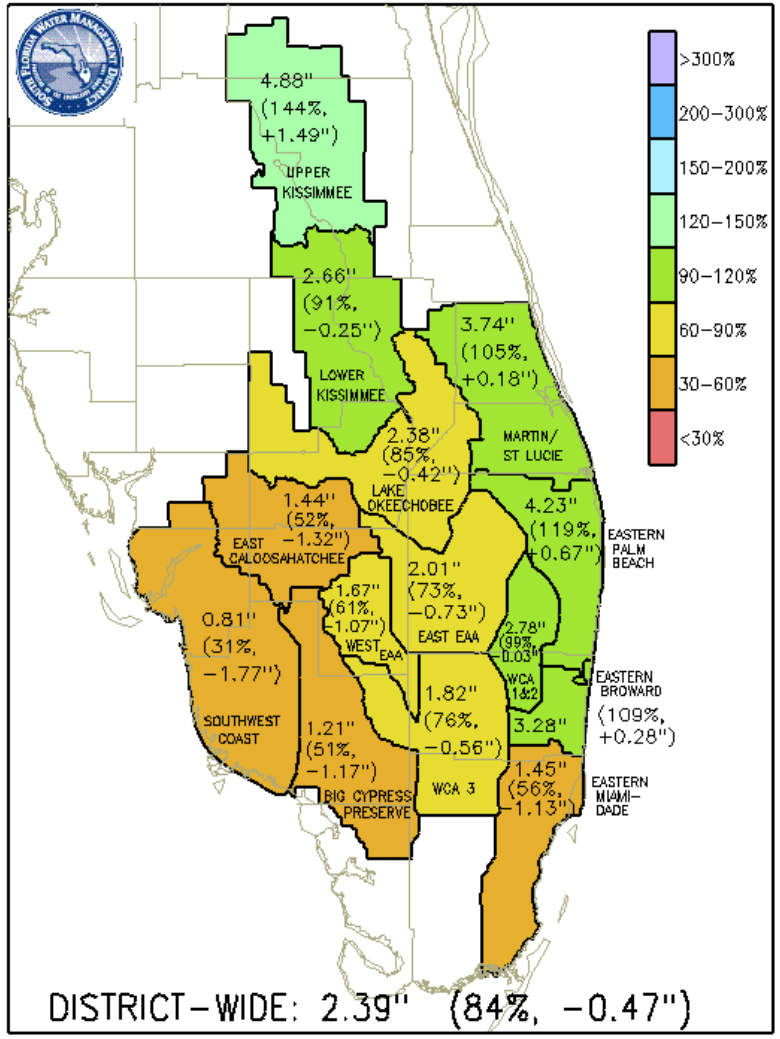
January 2016



February 2016

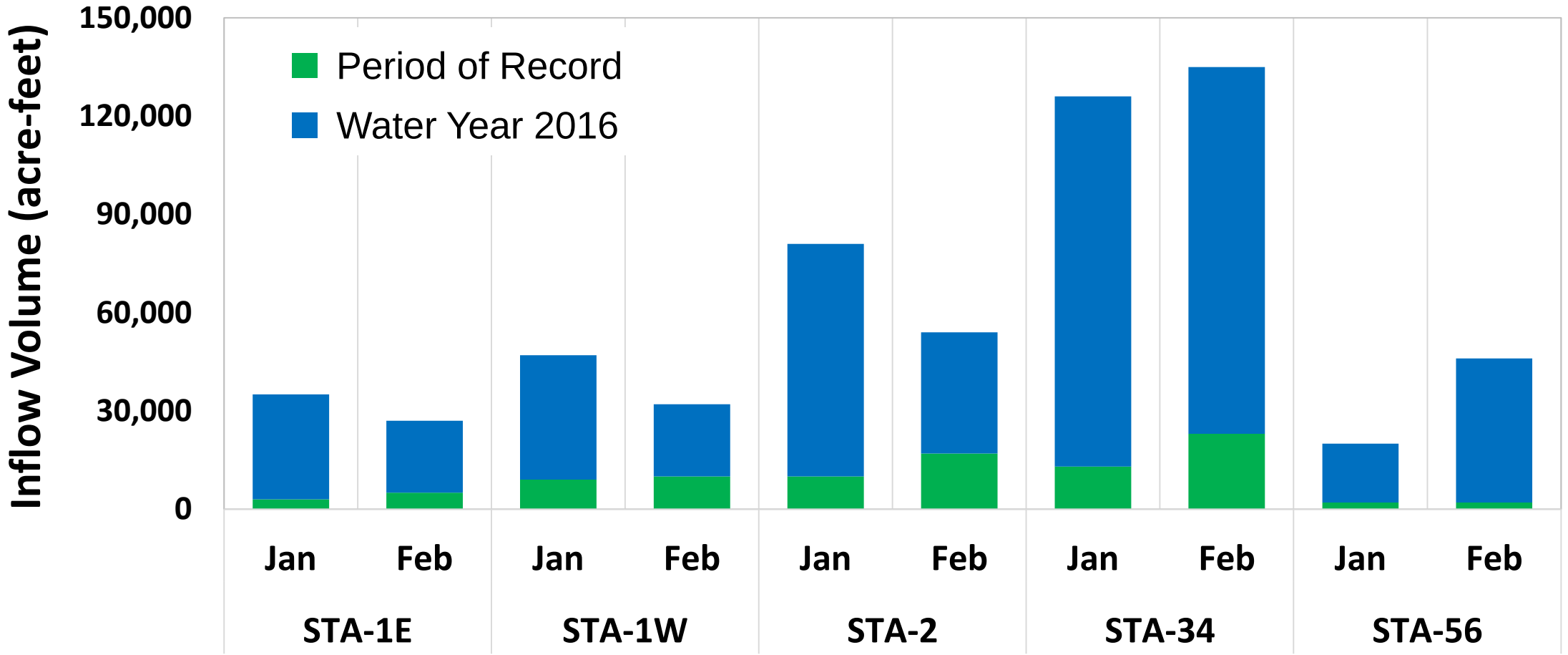


March 2016



Everglades STAs: Operations and Performance

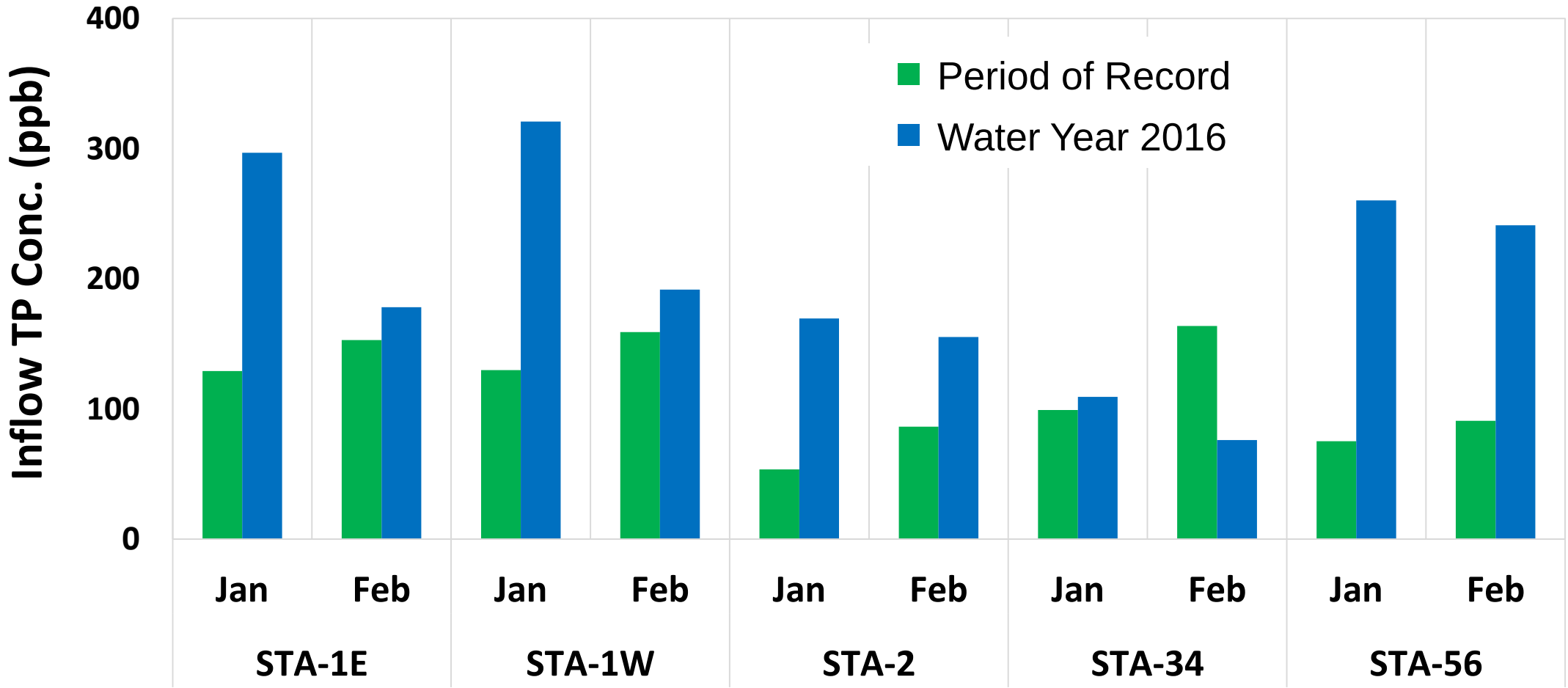
Inflow Volumes (January – February)



Includes provisional data which is subject to change

Everglades STAs: Operations and Performance

Inflow Phosphorus Concentrations (January – February)



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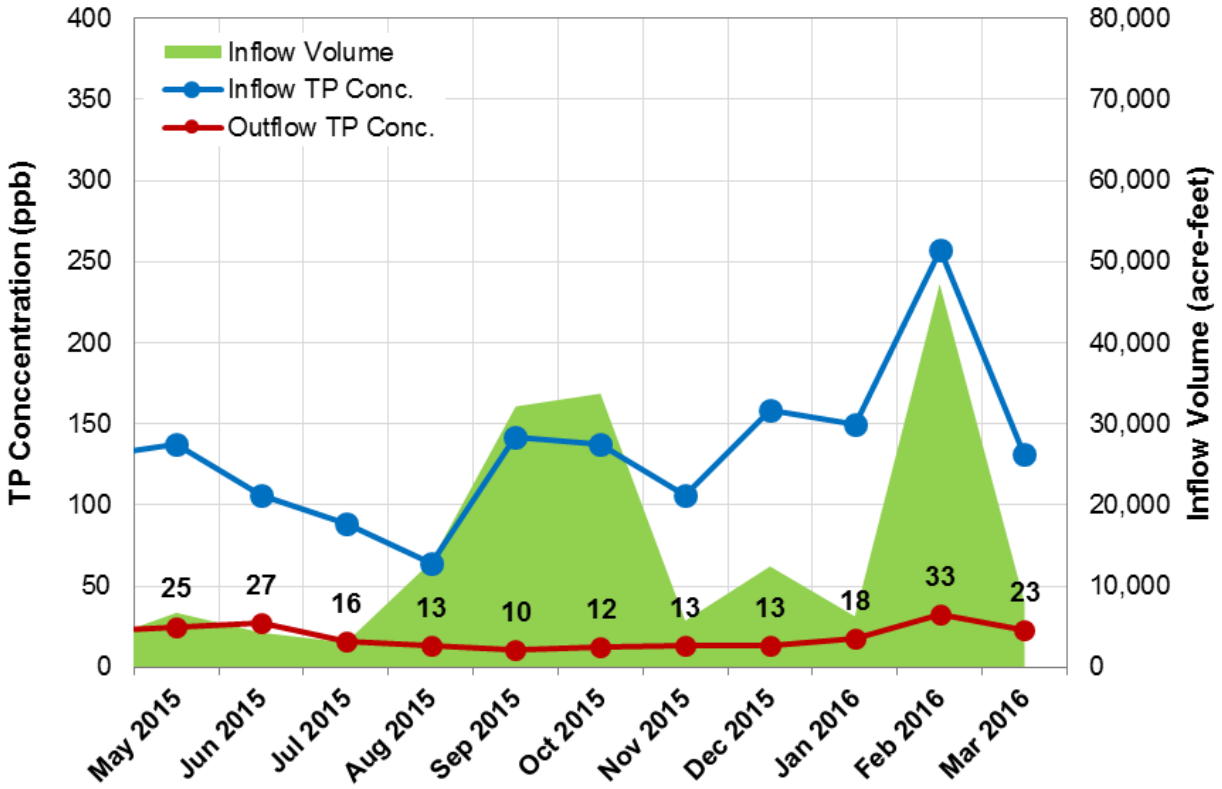
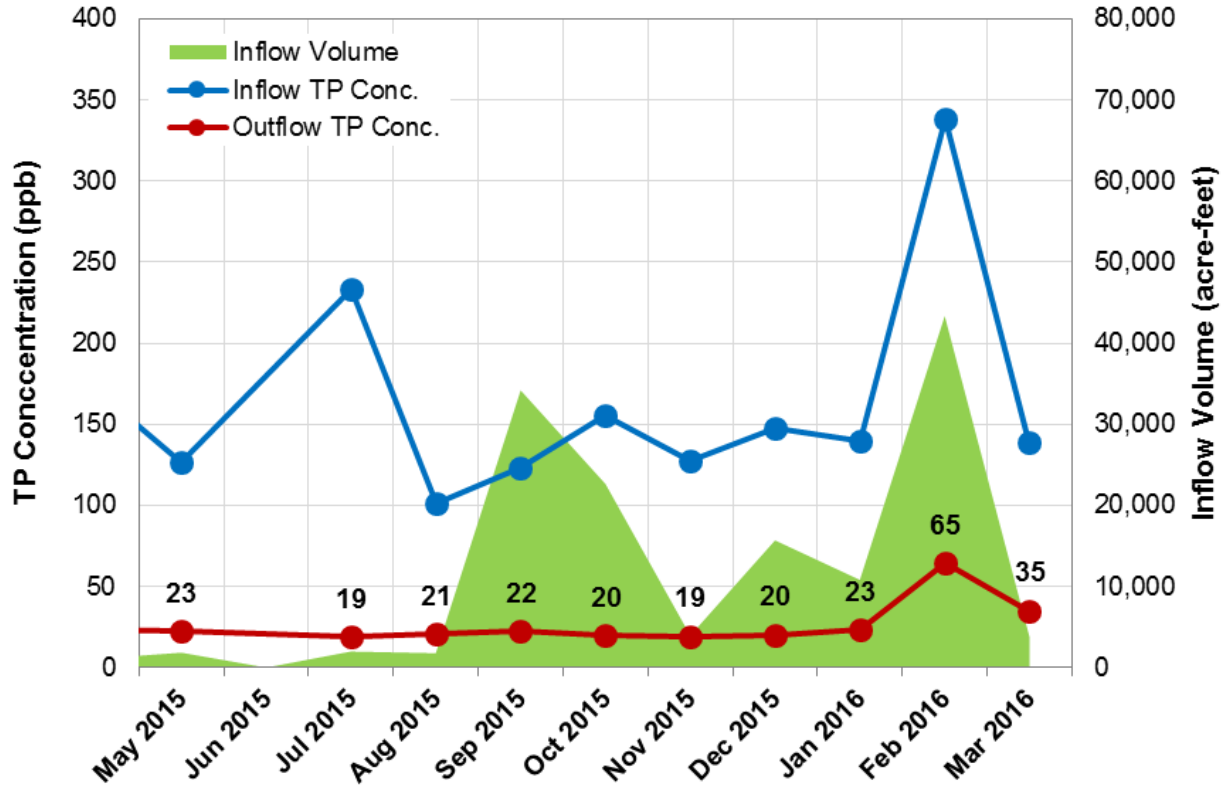
Everglades STAs: Operations and Performance

Phosphorus Concentrations and Inflow Volumes (Water Year 2016)

STA-1E



STA-1W

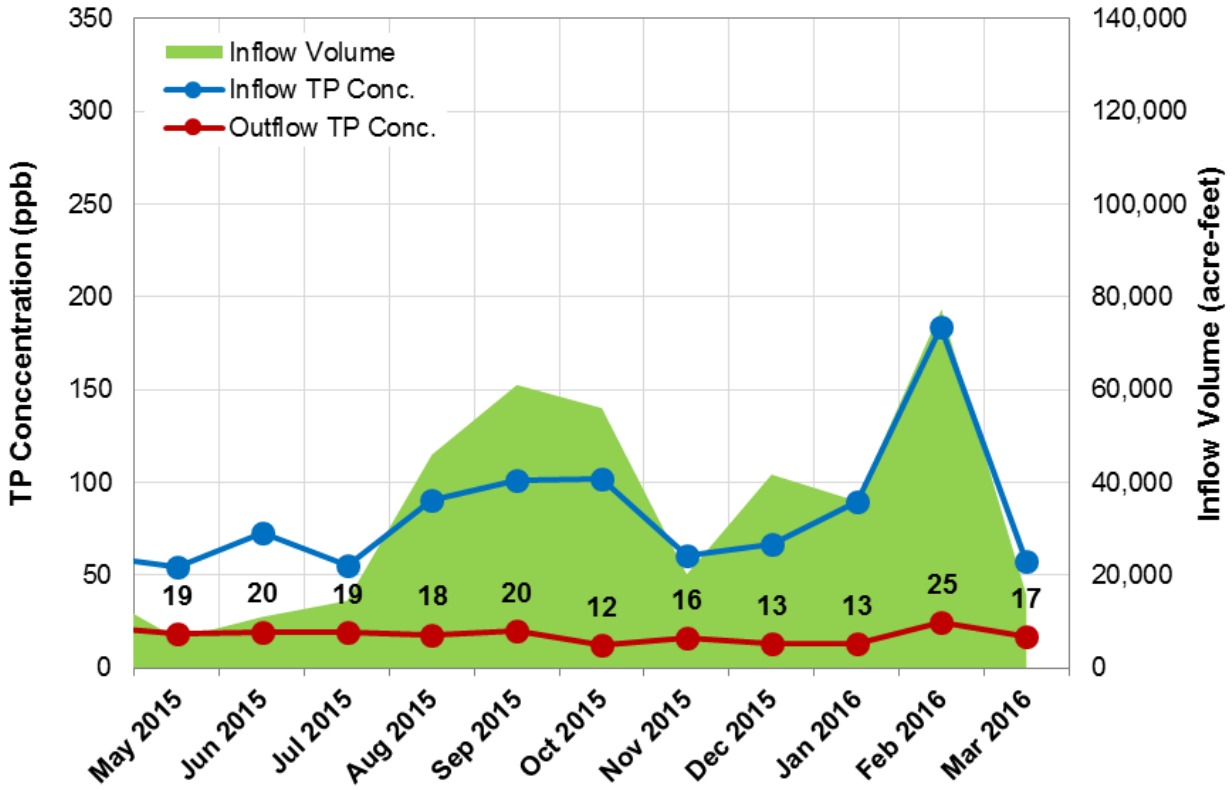


Includes provisional data which is subject to change

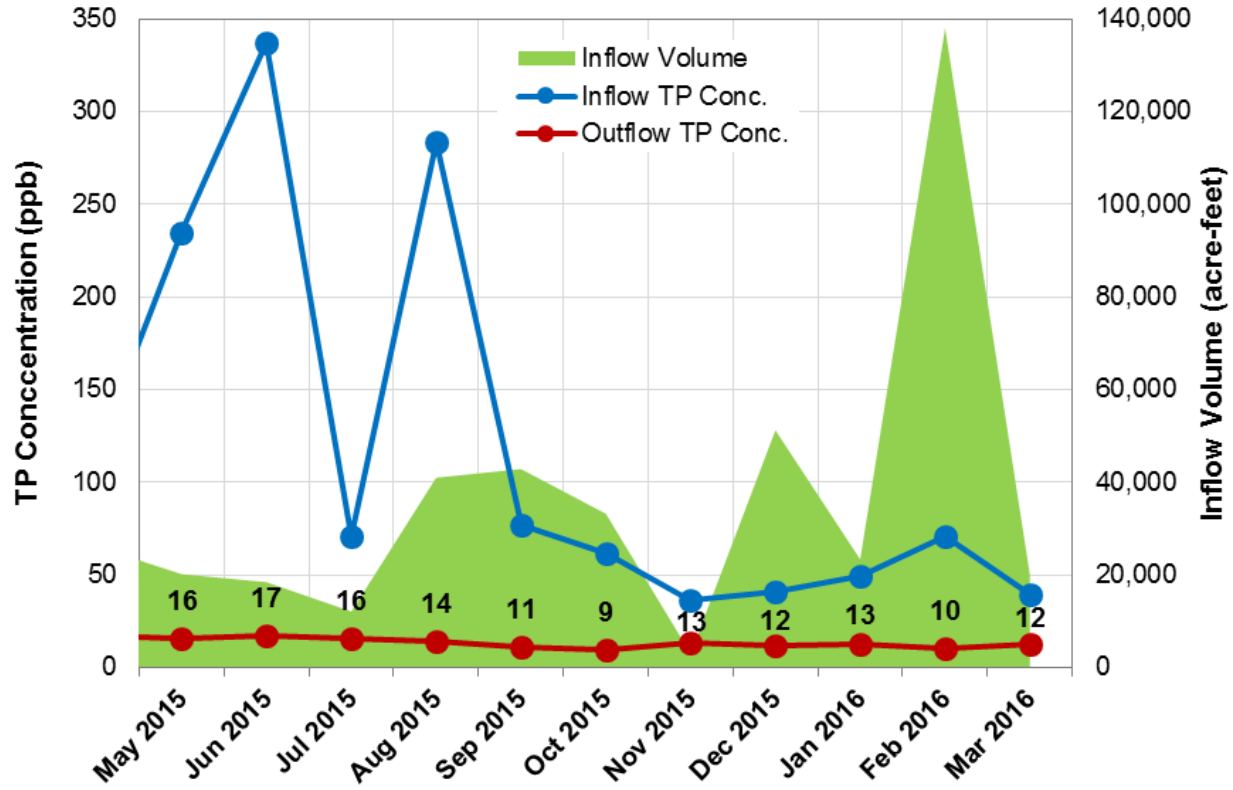
Everglades STAs: Operations and Performance

Phosphorus Concentrations and Inflow Volumes (Water Year 2016)

STA-2



STA-3/4



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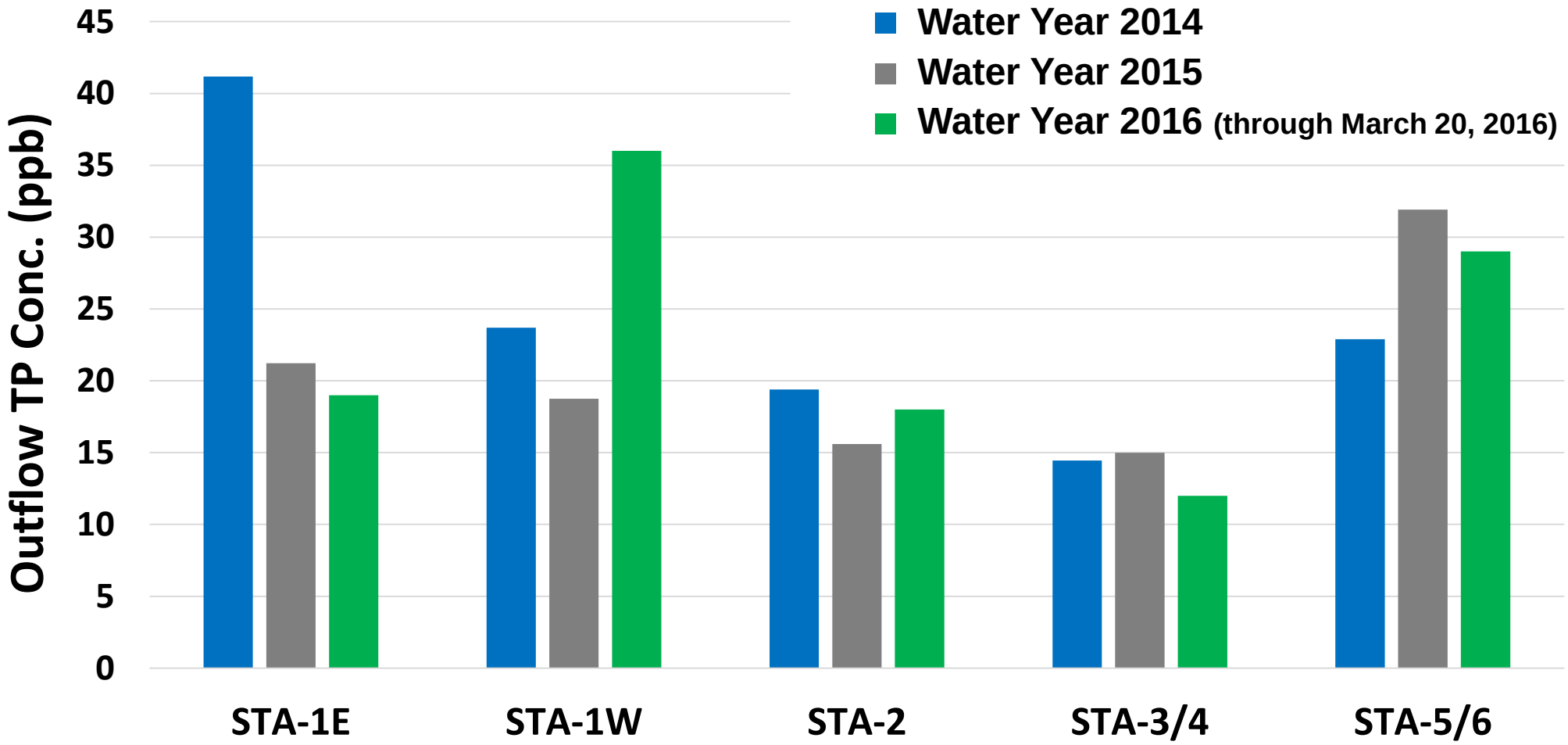
Everglades STAs: Operations and Performance

Annual Outflow Phosphorus Concentrations



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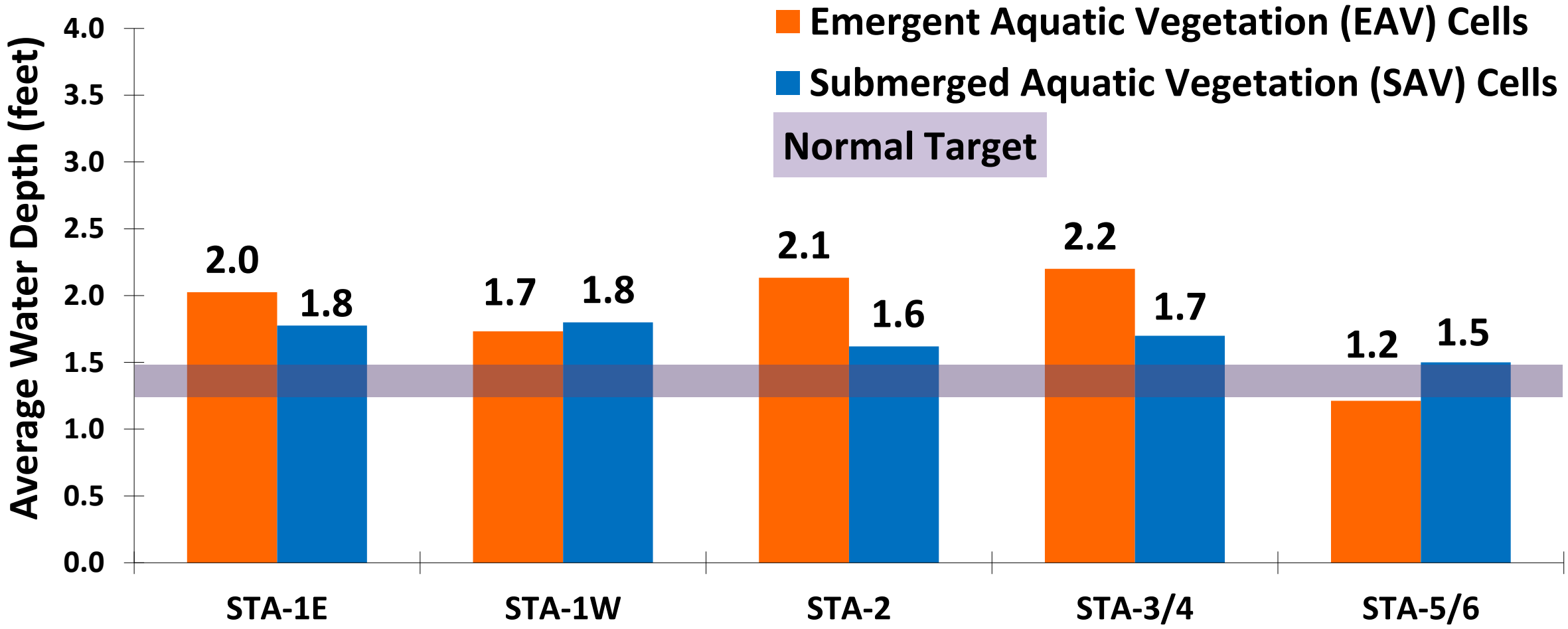
Everglades STAs: Operations and Performance

Water Depths (as of April 4, 2016)



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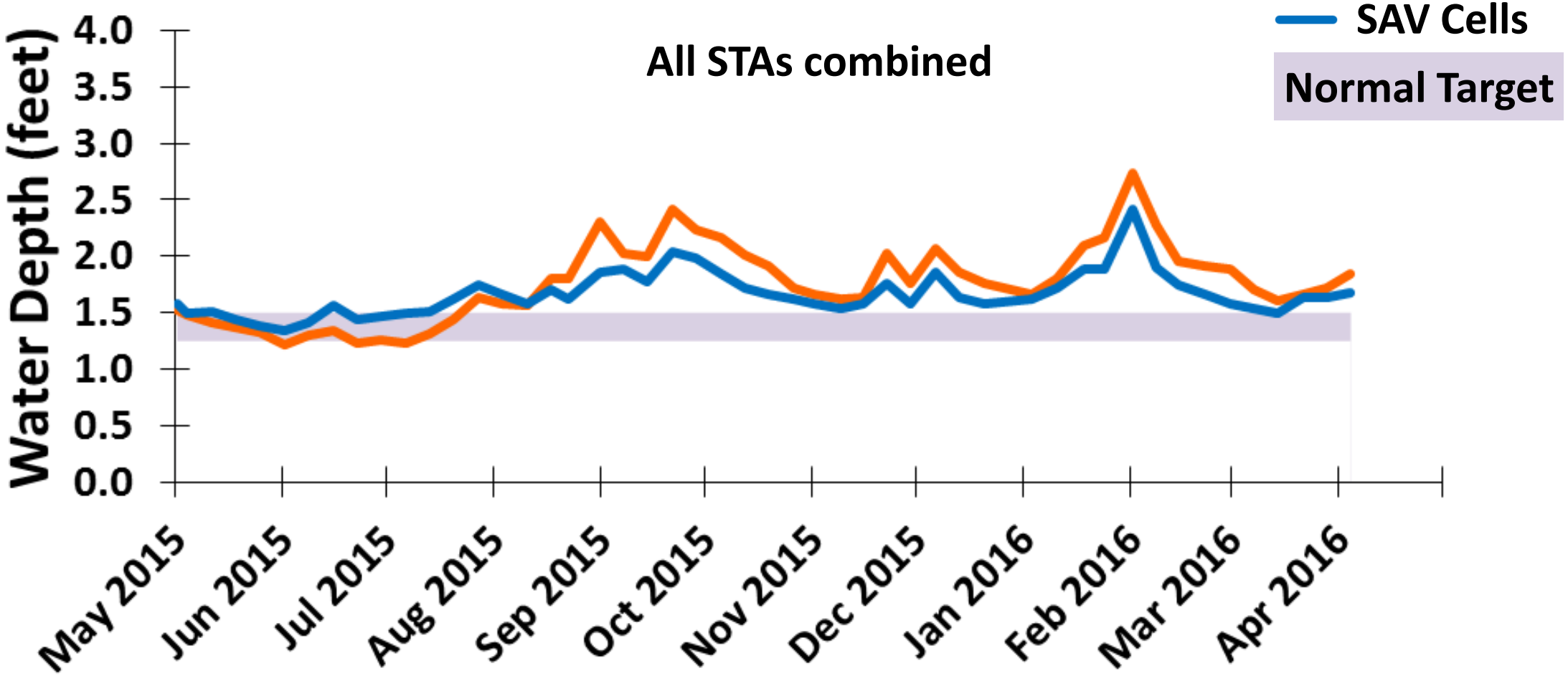
Everglades STAs: Operations and Performance

Water Depths (Water Year 2016)



Includes provisional data through April 4, 2016 which is subject to change

Everglades STAs: Vegetation Conditions

- Many STA cells have excellent EAV and SAV coverage
- In some STA cells, EAV and SAV establishment is ongoing
- SAV loss occurs during the dry season in all STAs, which can affect treatment performance
- Major vegetation management and rehabilitation activities typically occur during the dry season (Nov. – May)
- Undesirable vegetation is controlled throughout the year

Everglades STAs: Potential Operational Restrictions

- Structure Repairs at STA-1E (by U.S. Army Corps of Engineers)
- Vegetation Rehabilitation at STA-1E, STA-1W, STA-3/4 and STA-5/6

Everglades STAs: Lake Okeechobee Discharges South

Time Period	Total Lake O Discharges South (acre-feet)	Lake O Discharges South to STAs/FEBs (acre-feet)
November 2015 to date	200,000	66,000
May – October 2015	568,000	193,000
May 2015 to date	768,000	259,000
May 2014 – April 2015	1,189,000	586,000

Includes provisional data through April 3, 2016 which is subject to change

Everglades STAs: Examples of Operational Priorities and Constraints

- Avoid hydraulic and phosphorus overloading
- Minimize the magnitude and duration of higher than desirable water depths
- Maintain normal target water depths between storm events
- Minimize diversion of untreated stormwater to the Everglades
- Maintain minimum water depths
  - Keep vegetation alive and ready for treatment
  - Avoid dryout (and potential phosphorus spikes)

Everglades STAs: Examples of Operational Decision Inputs

- Outflow phosphorus concentrations
- Performance trends (weekly, monthly, annual)
- Phosphorus loading rates
- Current and recent water depths and flow volumes
- Vegetation conditions
- Status of routine and major vegetation rehabilitation activities
- Weather / climate forecasts
- Conditions in regional water management system

WEEKLY STA PERFORMANCE SUMMARY

DATE 3/22/2016 — **LATEST DATA 03/20/2016**

		Entire STA	W Flow-way	C Flow-way	E Flow-way
	Inflow Volume (ac-ft)	191,231	48,444	71,043	52,366
	Inflow Load (kg)	38,603	7,698	6,975	4,914
	Inflow Flow-weighted Mean Conc (ppb)	164	129	80	76
	Outflow Volume (ac-ft)	171,314	58,533	60,045	59,097
	Outflow Load (kg)	4,012	2,865	960	1,011
	Outflow Flow-weighted Mean Conc (ppb)	19	40	13	14
	365-day load reduction (kg)	34,590	4,832	6,014	3,904
	Inflow Volume (ac-ft)	8,016	456	3,630	1,132
	Inflow Load (kg)	1,295	98	383	116
	Inflow Flow-weighted Mean Conc (ppb)	131	174	86	83
	Outflow Volume (ac-ft)	6,363	554	2,465	109
	Outflow Load (kg)	179	38	65	5
	Outflow Flow-weighted Mean Conc (ppb)	23	56	21	34
	Inflow Volume (ac-ft)	2,322	456	163	263
	Inflow Flow-weighted Mean Conc (ppb)	147	174	52	72
	Outflow Volume (ac-ft)	1,403	178	no flow	no flow
	Outflow Flow-weighted Mean Conc (ppb)	19	57	no flow	no flow
	365-day Phosphorus Loading Rate ($g/m^2/yr$)	1.9	1.0	0.9	1.1

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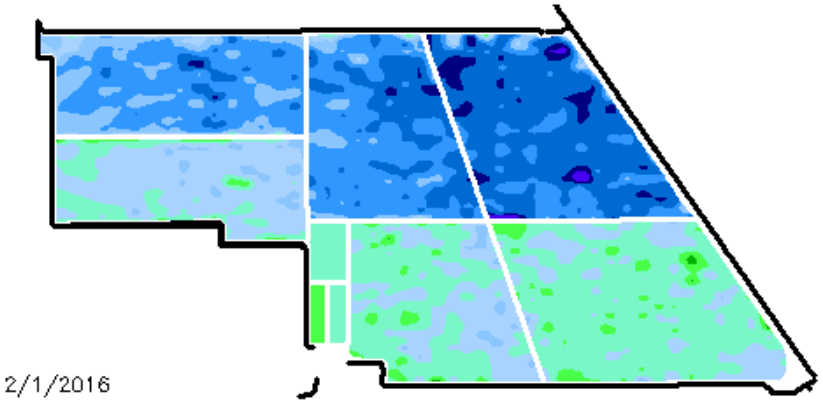
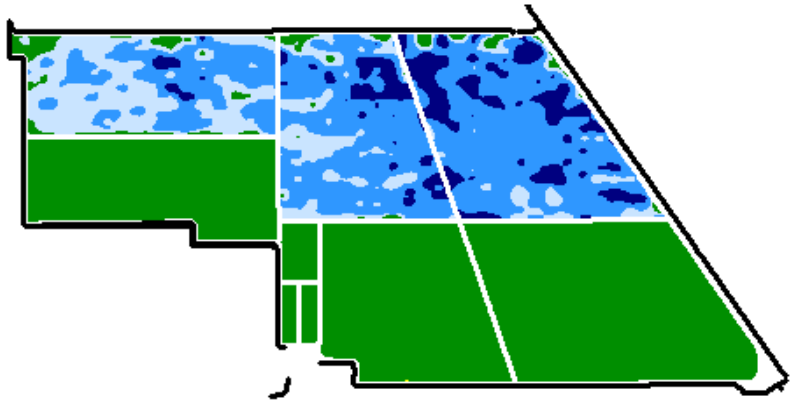
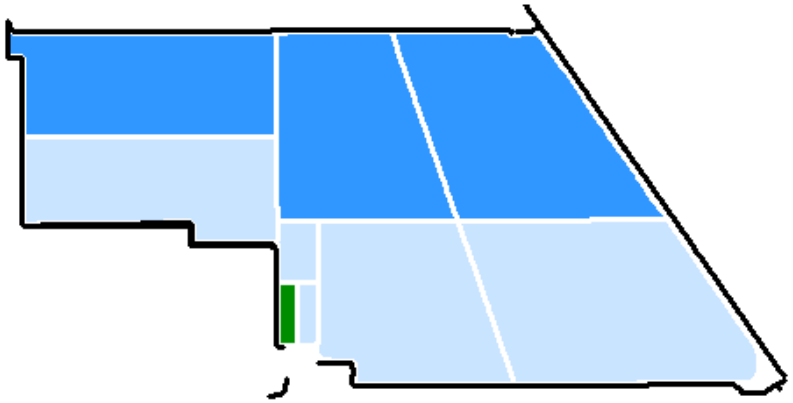
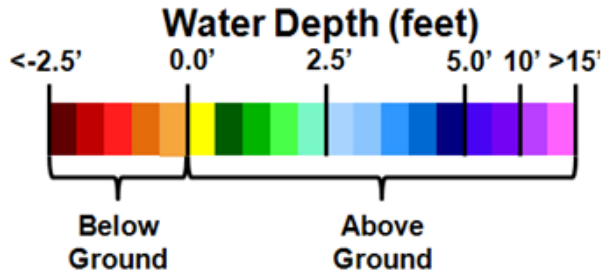
Everglades STAs: Operational Decision Inputs (cont'd)







STA-3/4



STA Seasonal Constraints Index

- 3 of 3
- 2 of 3
- 1 of 3

Flood Conditions Met
- ≥4.0' for 3 consecutive days
- ≥3.5' for 7 consecutive days
- ≥3.0' for 10 consecutive days

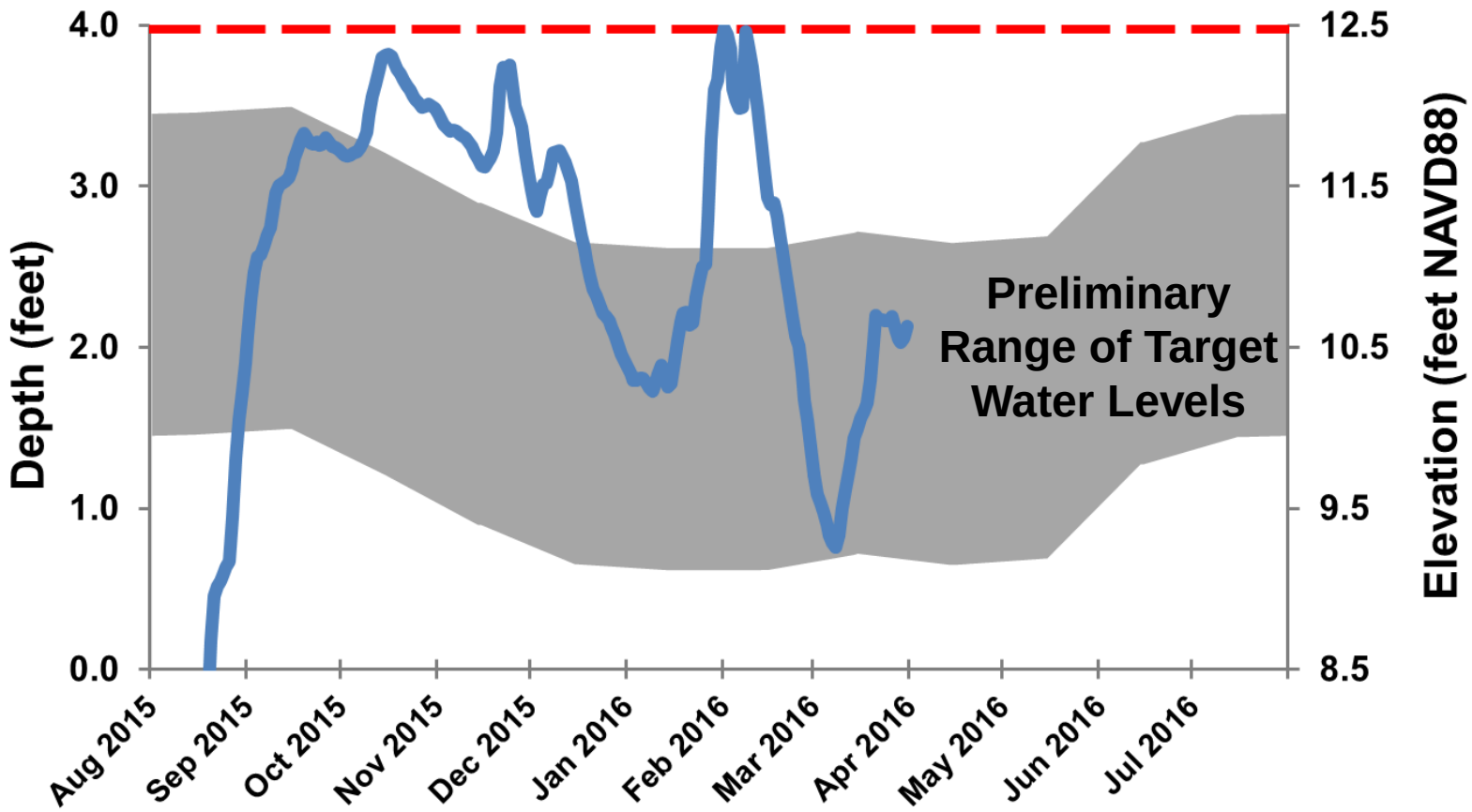
- Target Depth or Above
- Below Target Depth: 0.75'-1.25' in SAV and Emergent Cells
- Between Target and Min Depth: 0.5'-0.75' in SAV Cells / -0.5'-0.75' in Emergent Cells
- Below Minimum Depth: <0.5' in SAV Cells / <-0.5' in Emergent Cells

Stage Based: Relative to Target Stage (TS)
- Deep Water Level (> 2.8' above TS)
- High Water Level (1.5' - 2.8' above TS)
- Contingency Stage (0.5' – 1.5' above TS)
- Target Stage (TS +/- 0.5')
- Low Water Level (< 0.5' below TS)

Depth / Area Based: Percent of Area Dry
- 0-25% Dry
- 25-50% Dry
- 50-75% Dry
- 75-100% Dry

A-1 Flow Equalization Basin: Operations and Phosphorus Removal Performance

- A-1 FEB intended to improve performance of STA-2 and STA-3/4
- Since March 9, total inflows averaged ~1,800 acre-feet per day
- Since March 9, Lake O releases to A-1 FEB averaged ~1,000 acre-feet per day



Includes provisional data through March 31, 2016 which is subject to change

Everglades STAs: Summary

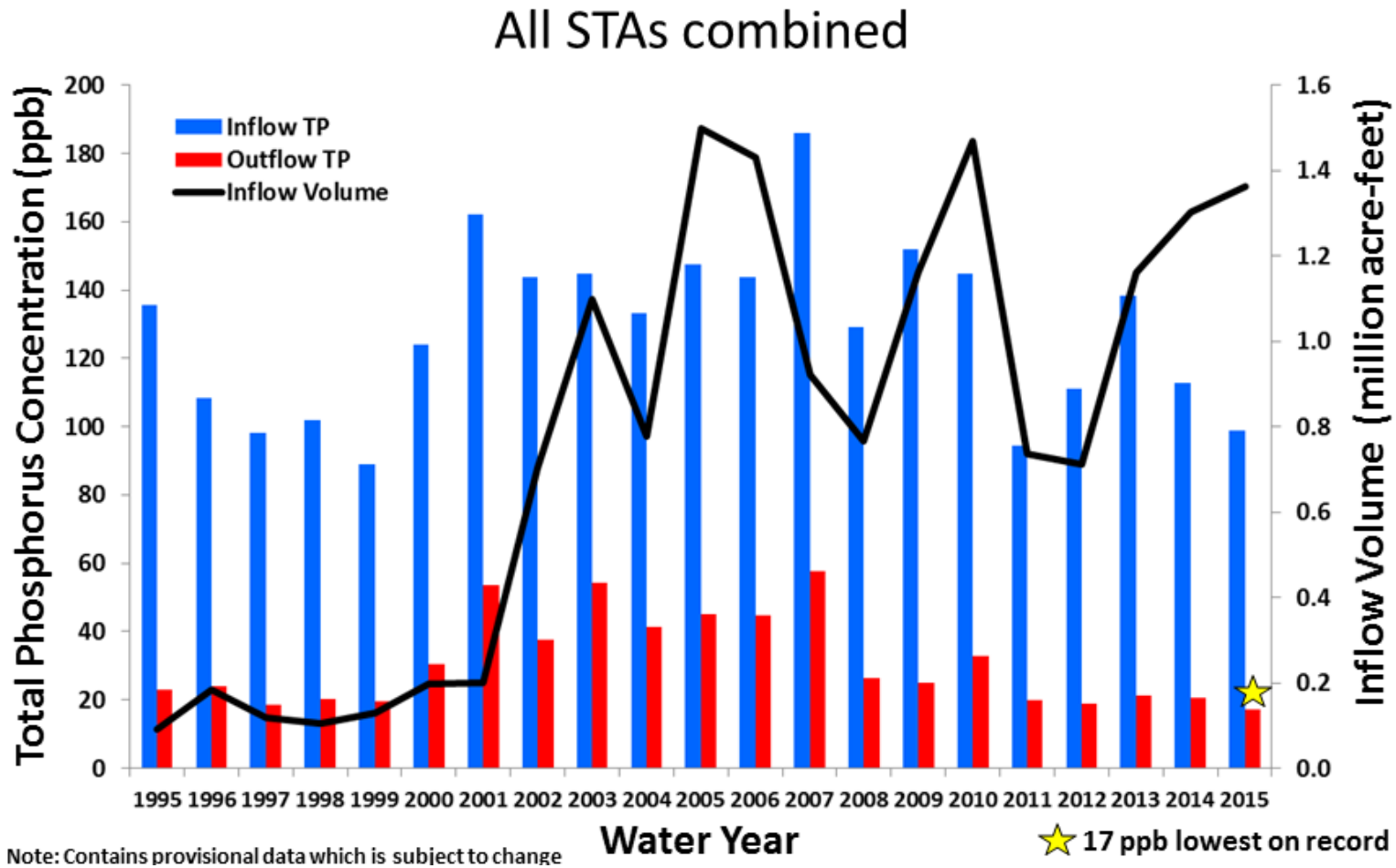
L-8 Flow Equalization Basin

- STAs are performing well, despite wetter than normal dry season conditions
- STA conditions and performance will continue to be carefully monitored and evaluated
- Vegetation management and rehabilitation activities are ongoing
- Due to recent relatively high phosphorus loading, STA treatment performance decline in the wet season is possible

Follow-up from January 2016 WRAC Presentation

Action Item #1: *Verify the total cost to date of the District's Everglades-related water quality improvement projects.*

Action Item #2: *Attempt to determine the drivers of the apparent spikes in STA inflow phosphorus concentrations in Water Years 2001 and 2007.*




Questions?